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ORIGINAL ARTICLE

Articular facets syndrome: diagnostic grading and treatment options

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Abstract Approximately 80% of the adult population suffers from chronic lumbar pain with episodes of acute back pain. The aetiology of this disorder can be very extensive: degenerative scoliosis, spondiloarthritis, disc hernia, spondylolysis, spondylolisthesis and, in the most serious cases, neoplastic or infectious diseases. For several years, the attention of surgeons was focused on the articular facets syndrome (Lilius et al. in J Bone Joint Surg (Br) 71-B:681–684, 1998), characterised clinically by back pain and selective pressure soreness at the level of the facets involved. The instrumental framework highlights widespread zigoapophysary arthritis and hypertrophy/degeneration of articular facets due to a functional overload. This retrospective study analyses the patients who arrived at our observation and were treated with a neuroablation using a pulsed radiofrequency procedure, after a CT-guided infiltration test with anaesthetic and cortisone. From the data collected, it would seem that this procedure allows a satisfactory remission of the clinical symptoms, leaving the patient free from pain; furthermore, this method can be repeated in time.

Keywords Articular facet syndrome · Radiofrequency · Low back pain

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Introduction

In the past few years, the articular facets syndrome has been unanimously accepted as a specific entity [2]. It has pathological, clinical and instrumental details that identify it. Clinically, it is characterised by: low unilateral or bilateral back pain; pressure soreness at the level of the facets involved; lower limb pain, but not radicular; pain increase during rotation or torsion movements; greater pain during extension with respect to flexion; pain in the transition from the seated position to the erected one; reduced range of movement; greater stiffness in the morning [3]. With regard to the diagnostic imaging, the standard X-ray examinations are not very useful as they are often negative, and they can only show initial signs of arthritis or, as Putti [4] demonstrated, some angular anomalies of the facets. The CT scans and MRI are more useful as we can view the severe degeneration of the facets (hypertrophy, arthritis, oedema) and exclude other diseases associated primarily with the disc (discopathy/hernia).

In this retrospective study, we included cases undergoing neuroablation treatment using pulsed radiofrequency, after CT-guided infiltration test with anaesthetic and cortisone, which is used to evaluate a possible inclusion in a further denervation procedure.

Radiofrequency denervation was introduced by Shealy [5] in 1974. The purpose of this procedure is "stunning"

(neuromodulation) of the selected nervous fibres in order to reduce the pain. The radiofrequency used is pulsed and it allows heat dissipation, by reaching temperatures between 42 and 43°C, thus producing a temporary injury that affects only type C fibres responsible for pain conduction. The radiofrequency system must allow the impedance measurement and the stimulation of the nervous tissues with a wide range of frequencies, in order to run a sensory and motor test, with an accurate measurement of time, temperature and voltage reached [6].

The procedure consists in the positioning of an electrode with a local anaesthesia under fluoroscopic control. The target to be reached is located underneath the superior articular process and at the base of the transverse process, where there is the medial branch of the posterior branch of the spinal nerve, which is responsible for the articular facets' innervation. Radiographically, it corresponds to the so-called "eye of the dog" visible in oblique projections. Every facet joint is innervated respectively by the upper and the lower branch of the medial branch, so the procedure must always be performed on at least two levels [7, 8]. In the protocol we have followed, however, we make the denervation at least at three levels. The target for the L5-S1 facet is different because the electrode must be positioned medially to the sacral wing and laterally to the superior articular process of S1 [8].

After the appropriate investigations to determine the right position of the electrode using fluoroscopy in oblique, AP and LL projections, it is possible to start the sensory and motor tests. The sensory test, after a correct stimulation, is designed to recall the lumbar pain with a possible involvement of the proximal part of the lower limb without a real radicular irradiation. The motor test allows to appreciate a response of the paravertebral muscles; any contraction of the gluteus or of the lower limbs' muscles indicates an incorrect positioning. Once both tests are done, it is possible to start the treatment with radiofrequency.

Materials and methods

The study carried out is a retrospective one, from 2006 to the end of 2007. All the patients gave informed consent to be enrolled. The population was composed of 32 patients, of with 35% (11 cases) male and 65% (21 cases) female; the average age was 49.8 years (range 30/79). The inclusion criteria was low back pain, uni or bilateral with radiographic (CT or MRI) evidence of articular facets' degeneration. We excluded patients with radicular pain, stenosis of the spinal canal, spondylolysis, spondylolisthesis and neoplastic and infectious disease.

As much as 28% (9 cases) of the population underwent, before the denervation, other procedures such as decompression for disc hernia (3), interspinous devices (4) or vertebral stabilization (2), while in 72% (23) of the cases the neuroablation was the first procedure. The investigations carried out were: L-S spine standard X-rays, dynamic and oblique X-rays, MRI and CT scan for the study of the facets.

The patients had in 19% (6) of cases a unilateral pain and bilateral in 81% (26).

In 63% (20 cases), only one level was involved (10 cases L4-L5, 9 cases L5-S1, 1 case L3-L4), in 37% two levels (12 cases L4-L5 and L5-S1), 60% (19) of cases had only back pain, and 40% (13) had back pain associated with a widespread lower limb pain (never radiculopathic). In 12% (4) of the patients, there was an associated untreated degenerative scoliosis. All patients underwent a CT-guided infiltration test of the articular facets joint with 1.5 ml of bupivacaine (10 mg/ml) and 1 ml of triamcinolon (40 mg/ml); the test was considered positive if there was a remission of the symptoms. After a period of time (on average 4.6 months) we proceeded to treat the patients with pulsed radio frequency using the following protocol: stimulation at 50 Hz, impedance >450 ohms, frequency 2 Hz, impulse duration 20 ms at 45 V, duration of the treatment 180 s [6]. All the CT-guided infliltration tests were performed by the same radiologist at the UO of Radiology. All the neuroablations were done by the same surgeon at the UO of Scoliosis and Vertebral Disease at the Orthopedic Institute Gaetano Pini of Milan.

The aim of the study was to evaluate if the denervation procedure using pulsed radiofrequency may be considered a valid and safety procedure for patients affected by articular facet syndrome and if the results were stable over time. The follow-up was for 6–12 months, using a clinical evaluation and the VAS. We calculated the average of the VAS value before and after the treatment and we performed a statistical analysis using the paired student's t test.

Results

The post-operative management of the patients involved was free of major complications. we had three cases of post-denervation neuralgia characterised by an extensive "burning" feeling, which spontaneously disappeared in 6–8 weeks. In 75% (24) of cases, there was a marked post-operative improvement of the pain, as shown by the VAS and the clinical evaluation, whilst in 25% (8) of cases, the procedure did not achieve any benefit. The results of the paired t test based on the VAS value before and after the procedure was: $t = 10.1$, $df = 31$, $P < 0.01$. Before the procedure the VAS had a mean of 7.91, the 95% confidence interval for mean was 7.626–8.186, the standard

deviation was 0.777 and the median was 8.00. The average absolute deviation from median was 0.594. After the procedure, the mean was 3.66, the 95% confidence interval for mean was 2.780–4.533, the standard deviation was 2.43, and the average absolute deviation from median was 1.66.

At follow-up (6–12 months) performed only on the patients who had a benefit from the procedure, 50% (12) of patients had a state of well-being, 29% (7) had discrete symptoms, while 21% (5) had a flare of the symptoms; two of these patients wanted a repeat of the procedure.

Conclusions

After analysing the clinical results in relation to the type of the patients treated, it can be inferred that the best results, in terms of VAS, were achieved in those patients who came to our observation with: the first diagnosis of facets syndrome, and therefore not previously operated on for other vertebral diseases, including scoliosis patients as well. Other criteria for a successful procedure are the presence of low back pain without any radiation, accuracy of the infiltration (without extravasation), which makes it more reliable, and the young age of the patients.

Therefore, we can conclude that denervation using pulsed radiofrequency is a valid procedure, well-tolerated by patients. It gives a period of wellness between 6 months and 1 year, and it may be repeated with complete safety over time. It is very important to properly select the patients and to execute correctly the infiltration test and the denervation procedure. The ideal candidates are those who have a relief of pain over 90% after the infiltration of the facets.

Conflict of interest statement None of the authors has any potential conflict of interest.

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